

## Experience report

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### *Why Michigan State University?*

During my bachelor program at the Heinrich-Heine-University I got into an international bachelor program involving a two semester period at Michigan State University, MSU for short, in East Lansing, Michigan. Our University has a very committed cooperation with the renovated public university in the Midwest of the United States. MSU is a world-renowned and one of the largest universities in the US with around 500.000 alumni as a member of the Association of American Universities. MSU is at the forefront of scientific research, contains no less than three medical faculties that make it one of the best institutions. The wide ranges give me the opportunity to accomplish an internship in the toxicological and pharmacological department, what allowed me to apply and improve the laboratory techniques I have acquired to date, be exposed to the latest advancements in these fields, but more importantly, absorb an international insight on how science is being studied and advanced on an international scale.

### *Preparation for the adventure*

Well, during my first stay in East Lansing I found good friends, I loved the culture, the excessive passion about college football, the cold climate and the good food!!! Due to my good experience, also in the laboratory, I decided to come back and complete my bachelor degree at MSU, and Professor Dr. Robert Roth offered me the capability to work on my bachelor thesis in his laboratory to continue my project. Since I knew how everything is working over there, plus heaving great and helpful people around, the arrangements and organization for my stay were uncomplicated. I found a nice house in the student district and lived with two other undergraduate students. This was quite different from the previous place, which was organized by the university. One difficulty that you have by organizing everything by

yourself is the financial support. One reason I was so glad I got elected for the Wolters-Vollhardt scholarship.

*My research project in the toxicology and pharmacology department*

Dr. Roth's laboratory is interested in liver toxicology, especially the role of inflammatory stress combined with the response of different toxic chemicals particularly drugs. The major focus has been to understand idiosyncratic, drug-induced liver injury (IDILI). One drug associated with IDILI in human patients is diclofenac. Diclofenac is a widely used and effective drug, but in rare cases it can lead to liver toxicity. Over the past decades, co-workers developed several animal models in which liver injury occurred from drugs that cause IDILI in human patients. The results pointed to the involvement in the liver injury of several inflammatory mediators, including the cytokines tumor necrosis factor-alpha (TNF $\alpha$ ) and interferon-gamma (IFN $\gamma$ ), and this led to my hypothesis that IDILI-associated drugs like diclofenac enhance hepatocellular sensitivity to the killing actions of these cytokines. Thus, I explored the roles of calcium, calpain, caspases, jun-N-terminal kinase (JNK) and their relationship to endoplasmic reticular stress in the cytotoxic diclofenac cytokine synergy. For this *in vitro* study human-derived hepatoblastoma HepG2 cells were used. Thus, I learned cell culture techniques and procedures and made a lot experience how to deal with certain problems what eased my current laboratory work with primary cells. However, what we found at the end of my project is that diclofenac mediates cytotoxicity from interaction with TNF $\alpha$  and induces calcium release from intracellular stores. This cytotoxicity results from activation of caspase-3 through two different pathways involving calpain and UPR-mediated ER stress.

Based on the proposal we established, the out coming results are unexpected great. By the use of my high amount of data I merit co-authorship on one abstract that my graduate student mentor submitted for the Society of Toxicology (SOT) annual meeting in San Diego as well as on another abstract on which I was first author. A grant from the genetics program allowed me to participate on the SOT meeting and represent my data. The appearance on a huge international congress was a new level of experience in the scientific field. It opened new future perspectives and gave me an idea about the interdisciplinary and international science network. In addition to that, I was able to write a manuscript for a toxicological journal about my interesting results that I generated under the

supervision of my advisor. With this, and two other publications, I got the honor to get a co-author in several journals thanks to my internship in Dr. Roth's laboratory. Overall, it was a great challenge where my advisors supported me in every way! They motivated me every day by giving me "next level" tasks that needed to be managed by myself. Therefore, they showed me all needed skills to become a good and successful scientist.

### *My personal experience with the Spartans!*

Although, I already have been at MSU as a student I was very excited about my second abroad experience. The fact, that I went alone and not with an organized program and my German fellow students made this trip different. I knew, I am on my own and every decision has to be made by myself. On the other side I was looking forward seeing my new friends. The wonderful part here is that you are finding people from all over the world. MSU has so many international students that meeting new people is an exciting process. I made intense friendships with people from Taiwan, China and South America. We spend a lot of time together and shared out cultures and national cuisine. East Lansing is the capitol of Michigan and due to the central locality in Michigan there are a lot of travel opportunities. Thus, we made a couple weekend trips like to Detroit the most famous city in Michigan, Grand Rapids a nice art delighted city in the west part of Michigan and of course the "small New York City" Chicago in Ohio. A very nice fact about Michigan is that it is surrounded by two of the Great Lakes, Lake Michigan and Lake Hudson. The nature over there is breathtaking and the enormous size of the lakes is just amazing.

About the American's I meet: I can just say that these people are very kind, helpful and full of joy! They are very hard working persons but they never forget to enjoy life. This attitude inspired me and I am so thankful that I found such good personalities that shared it with me. Let give me an example: Doesn't matter how much work someone had they never complained about it and were just happy to have a beer and a burger in the favorite pub with their favorite people. All of my professors I met whether from class or my laboratory rotations (including my previous stay) invited me to their homes for Christmas, Thanksgiving and Birthdays. They offered me a place to sleep or even lent me a car. There was a great relation between students and professors, but the respect was still there.

Another great point I really enjoyed was the weather conditions. They have very hot summers and very long and cold winters. I just undergo the winter period from October to March. The really cold and snowy days began in December. Since it was my second time there I was prepared and actually I liked it, especially because the winter in Germany is not that snowy. I have never seen so much snow, and the best part, this is completely normal over there, meaning the daily routine is unabated like the traffic and public transportation.

Last but not least, college football! Everybody at MSU or rather East Lansing is a fan of the college football team Spartans. And there is no excuse not watching a game, wearing green shirt and scream “Go green! Go white!” which is the popular cheer. A very nice tradition is tailgating. Before every MSU game student and families gather around the stadium on campus, play games, barbecue sausages and drink beer.

There is still so much more to tell but I hope I made it to the point that studying abroad enhances your experience in every level. A study abroad means a technical and personal extension. For my next career it is worthwhile, to work international and intercultural, as well. The requirement for this is a flexible internationalized education. Now, I see the necessity to learn the backgrounds of socializing international and social contacts.

Again, I am very glad that I got the Wolters-Vollhardt. Thank you.

**GO GREEN! GO WHITE!**



MSU college football game in the Spartan stadium